

Circuit Design and Simulation Study of an RSFQ Switch Element for Optical Network Switch Applications

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In this work, we have studied about an RSFQ (Rapid Single Flux Quantum) switch element. The circuit was designed, simulated, and laid out for mask fabrication. The switch cell was composed of a D flip-flop, a splitter, a confluence buffer, and a switch core. The switch core determined if the input data could pass to the output. “On” and “off” controls in the switch core could be possible by utilizing an RS flip-flop. When a control pulse was input to the “on” port, the RS flip-flop was in the set state and passed the input pulses to the output port. When a pulse was input to the “off” port, the RS flip-flop was in the reset state and prevented the input pulses from transferring to the output port. We simulated and optimized the switch element circuit by using Xic, WRspice, and Julia. The minimum circuit margins in simulations were more than $\pm 25\%$. We also performed the mask layout of the circuit by using Xic and Lmeter.

This research was supported by a grant from Center for Applied Superconductivity Technology of the 21st Century Frontier R&D Program funded by the Ministry of Science.

keywords : RSFQ switch, Optical Network switch, D Flip-Flop, RS Flip-Flop, RSFQ